

REMARKS

In the Office Action Summary, the Examiner indicated that claims 13-47 were pending at the time of examination, but addressed claims 12-47 in the Detailed Action. Applicants believe claims 12-47 were pending at the time of examination. Independent claims 12, 19, 37, and 41 have been amended, as have claims 16-18, 30-32, and 40. Claims 13-15 and 20-22 have been cancelled. Support for the amendments can be found throughout the specification, for example, at page 2, lines 10-15.

Rejection under 35 U.S.C. § 102(e)

Claims 12-16, 19-29, 34-38, 41, 45 and 47 have been rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,217,158 to Kanaya et al. ("Kanaya"). See the Office Action at page 2.

Independent claims 12 and 37 and dependent claims

Applicants have discovered a method of depositing ink that includes applying a jetting voltage across a first electrode and a second electrode on a face of a piezoelectric element to subject ink with the chamber to a jetting pressure. The stiffened piezoelectric element has a curved surface over the ink chamber, the curved surface having a substantially constant radius of curvature and being concave relative to the ink chamber. See independent claims 12 and 37. The stiffened piezoelectric element has a region spanning the ink chamber and being substantially completely exposed to the ink chamber. See independent claim 37.

The curved surface has a substantially constant radius of curvature and is concave relative to the ink chamber. Kanaya does not disclose a method of depositing ink using a stiffened piezoelectric element where the stiffened piezoelectric element has a curved surface over the ink chamber, the curved surface having a substantially constant radius of curvature and being concave relative to the ink chamber. Therefore, Kanaya does not anticipate claims 12 or 37, nor any of the claims that depend from them.

Claim 37 additionally recites that the stiffened piezoelectric element has a region spanning the ink chamber and being substantially completely exposed to the ink chamber, the exposed region having a curved surface over the ink chamber, the curved surface being concave

relative to the ink chamber. The Examiner has not addressed how Kanaya anticipates the piezoelectric element having a region spanning the ink chamber and being substantially completely exposed to the ink chamber. Kanaya does not describe any piezoelectric element having a region spanning the ink chamber and being **substantially completely exposed** to the ink chamber, and the curved surface being concave relative to the ink chamber. See, for example, Kanaya at column 7, lines 55-62 ("...The electrode 39 is formed on the lower side of the deformable region so that it is exposed to the pressure generating chamber 23"), and at FIG. 8a. The electrode, not the piezoelectric element, is exposed to the ink chamber. Kanaya, therefore, does not anticipate claim 37 or the claims that depend from it.

Applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. § 102(e) of independent claims 12 and 37, and the claims that depend from them.

Independent claims 19 and 41

Applicants have discovered an ink jet printing module that includes a stiffened piezoelectric element having a region exposed to an ink chamber, the piezoelectric element being positioned over the ink chamber to subject ink within the chamber to jetting pressure, and electrical contacts arranged on a single surface of the piezoelectric element for activation of the piezoelectric element. The region of the stiffened piezoelectric element exposed to the ink chamber has a curved surface, the curved surface having a substantially constant radius of curvature and being concave relative to the ink chamber. See independent claim 19. Applicants have also discovered an ink jet printing module that includes a stiffened piezoelectric element having a region spanning the ink chamber and being substantially completely exposed to the ink chamber, the piezoelectric element being positioned over the ink chamber to subject ink within the chamber to jetting pressure, wherein the region of the stiffened piezoelectric element exposed to the ink chamber has a curved surface that is concave relative to the ink chamber, and electrical contacts arranged on a surface of the piezoelectric element distal to the ink chamber for activation of the piezoelectric element. The curved surface has a substantially constant radius of curvature and is concave relative to the ink chamber. See independent claim 41.

Applicants describe the curved surface having a substantially constant radius of curvature and being concave relative to the ink chamber. Kanaya does not disclose an ink jet printing

module having stiffened piezoelectric element where the stiffened piezoelectric element has a curved surface over the ink chamber, the curved surface having a substantially constant radius of curvature and being concave relative to the ink chamber. Therefore, Kanaya does not anticipate claims 19 or 41, nor any of the claims that depend from them.

Applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. § 102(e) for independent claims 19 and 41, and the claims that depend from them.

Rejections under 35 U.S.C. § 103(a)

Kanaya in view of Watanabe

Claims 18 and 40 have been rejected under 35 U.S.C. § 103(a) as being obvious over Kanaya in view of U.S. Patent No. 6,361,154 to Watanabe et al. ("Watanabe"). See the Office Action at page 6. Claim 18 depends from claim 12, and claim 40 depends from claim 37.

Applicants have discovered a method of depositing ink that includes delivering ink to an ink chamber and applying a jetting voltage across a first electrode and a second electrode on a face of a piezoelectric element. The stiffened piezoelectric element has a region spanning the ink chamber and being substantially completely exposed to the ink chamber. The exposed region has a curved surface over the ink chamber, the curved surface being concave relative to the ink chamber. The curved surface has a substantially constant radius of curvature and is concave relative to the ink chamber. See independent claims 12 and 37. Claims 18 and 40 additionally recite the curved surface over the ink chamber has a radius of curvature of less than 5 millimeters.

The Examiner contends that Kanaya discloses all the claimed limitations except for the curved surface having a radius of curvature of less than 5 millimeters. As discussed above, Kanaya does not disclose all the features of independent claims 12 and 37. Watanabe does not cure this deficiency. The Examiner cites Watanabe at column 3, lines 61-64; column 6, lines 34-35; and Figs. 1-2 and 5. The cited portion of Watanabe describes a "maximum convex dimension." It does not describe a substantially constant radius of curvature.

Like Kanaya, Watanabe does not describe or suggest a method of depositing ink that includes applying a jetting voltage across a first electrode and a second electrode on a face of a stiffened piezoelectric element, or an ink jet printing module that includes electrical contacts

arranged on a single surface of the piezoelectric element for activation of the piezoelectric element, where the piezoelectric element has a curved surface having a substantially constant radius of curvature. Furthermore, there is no motivation to combine Kanaya and Watanabe. For at least these reasons, claims 18 and 40 are patentable over Kanaya in view of Watanabe.

Kanaya in view of Yamamuro

Claims 17, 30-33, 39 and 46 have been rejected under 35 U.S.C. § 103(a) as being obvious over Kanaya in view of U.S. Patent No. 4,700,203 to Yamamuro et al. ("Yamamuro"). See the Office Action at page 7. Claim 17 depends from claim 12; claims 30-33 depend from claim 19; and claim 46 depends from claim 41.

Applicants have discovered a method of depositing ink that includes applying a jetting voltage across a first electrode and a second electrode on a face of a stiffened piezoelectric element to subject ink within the chamber to a jetting pressure. The stiffened piezoelectric element has a curved surface over the ink chamber, the curved surface having a substantially constant radius of curvature and being concave relative to the ink chamber. Applicants have also discovered an ink jet printing module that includes a stiffened piezoelectric element having a region exposed to the ink chamber, the piezoelectric element being positioned over the ink chamber to subject ink within the chamber to jetting pressure, and electrical contacts arranged on a single surface of the piezoelectric element for activation of the piezoelectric element. The region of the stiffened piezoelectric element exposed to the ink chamber has a curved surface, the curved surface having a substantially constant radius of curvature and being concave relative to the ink chamber. See independent claims 12, 19 and 41.

As discussed above, Kanaya does not describe a method of depositing ink that includes applying a jetting voltage across a first electrode and a second electrode on a face of a stiffened piezoelectric element. Nor does Kanaya describe an ink jet printing module that includes electrical contacts arranged on a single surface of the piezoelectric element for activation of the piezoelectric element. Kanaya does not suggest a method of depositing ink that includes applying a jetting voltage across a first electrode and a second electrode on a face of a stiffened piezoelectric element or an ink jet printing module that includes electrical contacts arranged on a single surface of the piezoelectric element for activation of the piezoelectric element. Indeed,

Kanaya only describes electrodes on opposing faces of a piezoelectric element. Yamamuro does not cure these deficiencies.

Yamamuro does not describe or suggest a method of depositing ink that includes applying a jetting voltage across a first electrode and a second electrode on a face of a stiffened piezoelectric element, or an ink jet printing module that includes electrical contacts arranged on a single surface of the piezoelectric element for activation of the piezoelectric element.

Yamamuro describes an ink jet head including a film of polyvinylidene difluoride with conductive layers on opposing faces of the film. See Yamamuro at FIG. 14B and column 8, lines 6-39. Furthermore, there is no motivation to combine Kanaya and Yamamuro. Claims 17, 30-33, 39 and 46 are therefore patentable over Kanaya in view of Yamamuro.


Applicants respectfully request that the rejections under 35 U.S.C. § 103(a) be reconsidered and withdrawn.

CONCLUSION

Applicants ask that all claims be allowed. Please apply any charges or credits to deposit account 06-1050.

Respectfully submitted,

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